

# Claims

- [c1] A navigational aid for watercraft navigating a waterway comprising:  
one or more sensors for determining the position of said watercraft with respect to nearby landmarks; and  
a feedback device for updating a pilot of said watercraft as to said position.
- [c2] The navigational aid of Claim 1 wherein said feedback device is selected from a group consisting of a visual display and an audio device.
- [c3] The navigational aid of Claim 2 wherein said visual display displays a navigational chart showing a portion of said waterway being navigated by said watercraft.
- [c4] The navigational aid of Claim 3 further comprising a computer located in said watercraft, said computer generating said visual display and/or providing said audio feedback.
- [c5] The navigational aid of Claim 4 wherein said one or more sensors are coupled to said computer in said watercraft.
- [c6] The navigational aid of Claim 5 wherein said waterway is

a river or a canal having a structure selected from a group consisting of a lock and dam, one or more bridge piers and a dock.

[c7] The navigational aid of Claim 6 wherein said one or more sensors are coupled to said computer via a wireless network.

[c8] The navigational aid of Claim 7 wherein said one or more sensors are coupled to said computer via a Bluetooth network.

[c9] The navigational aid of Claim 8 wherein said wireless network is compliant with the 802.11(b) standard.

[c10] The navigational aid of Claim 6 wherein said one or more sensors are coupled to said computer via a hard wired connection.

[c11] The navigational aid of Claim 6 wherein at least one of said one or more sensors is a GPS receiver.

[c12] The navigational aid of Claim 11 wherein said visual display includes said waterway and said structure and further wherein a representation of said watercraft is overlaid on said display with a graphical indication of the distance of one or more points on said watercraft from one or more portions of said structure.

- [c13] The navigational aid of Claim 12 wherein said overlaid representation of said watercraft represents the actual position and orientation of said watercraft with respect to said structure.
- [c14] The navigational aid of Claim 13 wherein distances from said watercraft to the banks of said waterway and distances from said watercraft to various points of said structure are displayed by said watercraft-based computer.
- [c15] The navigational aid of Claim 14 wherein said watercraft is a tow comprising a towboat and one or more barges.
- [c16] The navigational aid of Claim 12 wherein said display is automatically zoomed to show more detail as said watercraft gets closer to said structure.
- [c17] The navigational aid of claim 10 wherein currents in said waterway are indicated by an arrow on the display showing the direction of said current, and further wherein the strength of said current is graphically represented.
- [c18] Te navigational aid of Claim 17 wherein said graphical representation of said current strength is shown by providing a correspondence between said strength of said current and the thickness of said arrow indicating the di-

rection of said current..

- [c19] The navigational aid of Claim 6 further comprising:  
a land-based computer having a visual display; a wireless network; and  
one or more antennae.
- [c20] The navigational aid of Claim 19 wherein said watercraft are connected to said wireless network when in close enough proximity to said one or more antennae to receive a signal.
- [c21] The navigational aid of Claim 20 wherein said watercraft are connected automatically to said wireless network when in close proximity to said one or more antennae.
- [c22] The navigational aid of Claim 21 wherein said watercraft-based computer and said land-based computer are able to exchange information when said watercraft is connected to said wireless network.
- [c23] The navigational aid of Claim 22 wherein structure is a lock and dam and further wherein said watercraft-based computer can automatically generate and transmit a request for lockage to said land-based computer.
- [c24] The navigational aid of Claim 23 wherein said land-based computer can generate and transmit a clearance

for lockage in response to a message from said watercraft-based computer.

[c25] The navigational aid of Claim 22 wherein said information includes readings from said one or more sensors.

[c26] The navigational aid of Claim 25 wherein said one or more sensors are connected directly to either said land-based or said watercraft-based computer or are in communication with said land-based or said watercraft-based computer via said wireless network

[c27] The navigational aid of Claim 26 wherein said land-based computer is located at or near said structure and further wherein said land-based computer displays a visual representation of said waterway and said structure

[c28] The navigational aid of Claim 27 wherein said land-based computer further displays representations of all watercraft connected to said wireless network overlaid on said representation of said waterway and said structure

[c29] The navigational aid of Claim 28 wherein said representations of said watercraft correspond to the actual position of said watercraft with respect to said structure

[c30] The navigational aid of Claim 29 wherein said land-

based computer allows the entry of waterway and structure conditions and status information, and further wherein said information is transmitted to said watercraft-based computer via said wireless network for display thereon.

[c31] The navigational aid of Claim 1 wherein said watercraft-based computer displays the position and speed information of said watercraft.

[c32] The navigational aid of Claim 31 wherein said watercraft-based computer local displays weather information

[c33] The navigational aid of Claim 32 wherein said watercraft-based computer provides audio feedback of said position and/or said speed information.

[c34] The navigational aid of Claim 33 wherein said audio feedback are spoken words generated by a text-to-speech generator running on said watercraft-based computer.

[c35] The navigational aid of Claim 34 wherein said position and speed information is transmitted to said land-based computer via said wireless network for display thereon.

[c36] An instrumented navigation system to aid a tow in traversing a lock and dam, comprising:

a watercraft-based computer having a visual display;  
software, running on said watercraft-based computer,  
for displaying a navigational chart showing the position  
of said tow with respect to said lock and dam; and  
one or more sensors for determining the speed and/or  
position of said tow and for sending said speed and/or  
position information to said watercraft-based computer  
for display on said visual display.

[c37] The instrumented navigation system of Claim 36 further  
comprising:

a land-based computer located at or near said lock and  
dam having a visual display; and  
software, running on said land-based computer, for dis-  
playing a representation of said lock and said tow.

[c38] The instrumented navigation system of Claim 37 further  
comprising a wireless network for linking said water-  
craft-based computer and said land-based computer  
and for allowing the exchange of information therebe-  
tween

[c39] The instrumented navigation system of Claim 38 further  
comprising one or more input modules for collecting in-  
formation and for transmitting said information to either  
of said watercraft-based computer or said land-based  
computer.

[c40] The instrumented navigation system of Claim 39 wherein at least one of said one or more ors is a GPS receiver.